



06775USA
7828.7082

THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of) Examiner: S. H. Versteeg
GOPALRAJA, et al.)
Serial No.: 10/632,882) Art Unit: 1753
Filed: 31 July 2003)

For: SELF-IONIZED AND CAPACITIVELY-COUPLED PLASMA FOR SPUTTERING AND
RESPUTTERING

TRANSMITTAL OF INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In accordance with 37 CFR 1.56, 1.97, and 1.98, enclosed please find Form PTO-1449 listing the attached references which might be deemed material to the examination of the above-identified application.

A. Non-English Language References

- ☐ Enclosed is a search report for a counterpart application.
- ☐ The search report Examiner has provided comments on the relevance of any non-English language references cited in the search report.
- ☐ The specification incorporates comments on the relevance of non-English language references.
- ☐ Set forth below are comments provided by the applicant's home country counsel on the relevance of non-English language references:

B. The information disclosure statement submitted herewith is being filed

- ☐ Within three months of the filing date of a national application or request for continued examination under 37 CFR 1.114.
- ☐ Within three months of the date of entry into the national stage as set forth in 37 CFR 1.491 in an international application.
- ☐ Before the mailing date of a first Office Action on the merits.
- ☐ Before the mailing date of a first Office Action after filing of a request for continued examination.

03/22/2007 AADDF01 00000009 10632882

01 FC:1806

180.00 OP

C. The information disclosure statement submitted herewith is being filed after the period specified in paragraph B, but before the mailing date of a final action under 37 CFR 1.113, a Notice of Allowance under 37 CFR 1.311, or any other action otherwise closing prosecution, and is accompanied by:

- ☐ A statement under 37 CFR 1.97(e); or
- ☒ A fee of \$180 as set forth in 37 CFR 1.17(p).

D. The information disclosure statement submitted herewith is being filed after the period specified in paragraph C, but before payment of the issue fee, and is accompanied by:

- ☐ A statement under 37 CFR 1.97(e); and
- ☐ A fee of \$180 as set forth in 37 CFR 1.17(p).

STATEMENT UNDER 37 CFR 1.97(e)

I, the person signing below, certify:

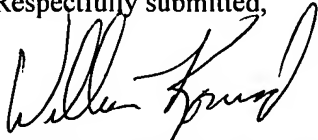
- ☐ That each item of information contained in the information disclosure statement submitted herewith was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the statement (37 CFR 1.97(e)(1)).
- ☐ That no item of information contained in the information disclosure statement submitted herewith was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the statement (37 CFR 1.97(e)(2)).

- continued -

If a fee is required under paragraph B or C *supra*, enclosed is Applicant's check in the amount of \$180 as set forth in 37 CFR 1.17(p). The Commissioner is authorized to charge any insufficiency or credit any overpayment related to this paper to Deposit Account 50-0585.

The Examiner is invited to contact the undersigned with any questions in this regard.

Respectfully submitted,

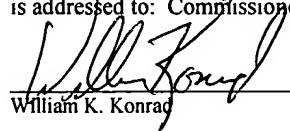


William K. Konrad, Reg. No. 28,868
KONRAD RAYNES & VICTOR, LLP
315 South Beverly Drive, Suite 210
Beverly Hills, California 90212
(310) 553-7970

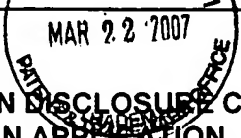
19 March 2007

(Date)

I hereby certify that this correspondence is being deposited with the United States Postal Service on the date indicated above and is addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.



March 19, 2007
(Date)

 <p>FORM PTO-1449</p> <p>INFORMATION DISCLOSURE CITATION IN AN APPLICATION</p> <p>(Use several sheets if necessary)</p> <p>7082</p>		<p>Docket Number (Optional) 006775USA</p> <p>Applicant GOPALRAJA et al.</p> <p>Filing Date July 31, 2003</p>		<p>Application Number 10/632,882</p> <p>Group Art Unit 1753</p>								
U.S. PATENT DOCUMENTS												
EXAMINER INITIAL	DOCUMENT NUMBER						DATE	NAME	CLASS	SUBCLASS	FILING DATE	
	6	6	1	0	1	8	4	8/26/03	Ding, et al.			
FOREIGN PATENT DOCUMENTS												
	DOCUMENT NUMBER						DATE	COUNTRY	CLASS	SUBCLASS	Translation	
	03	0	4	2	4	2	4	5/22/03	PCT			
OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)												
	US-2005-0255691 pub. 11-17-2005 (atty dkt 07094C)											
	Apblett, C., et al. "Silicon nitride growth in a high-density plasma system," Solid State Technology, Nov. 1995, pp 73 - 80.											
	Bader, H.P., et al. "Planarization by radio-frequency bias sputtering of aluminum as studied experimentally and by computer simulation," J. Vac. Sci. Technol. A., Nov/Dec 1985, pp 2167 - 2171.											
	Cheng, P., et al. "Directional deposition of Cu into semiconductor trench structures using ionized magnetron sputtering," J. Vac Sci. Technol. B., 13(2), Mar/Apr 1995, pp 203 - 208.											
	Getty, Ward D. "Size-scalable, 2.45-Ghz electron cyclotron resonance plasma source using permanent magnets and waveguide coupling," J. Vac Sci. Technol. B 12(1), Jan/Feb 1994, pp 408 - 415.											
	Gorbatkin, S.M., et al. "Cu metallization using a permanent magnet electron cyclotron resonance microwave plasma/sputtering hybrid system," J. Vac. Sci. Technol. B, Vol. 14, No. 3, May/Jun 1996, pp 1853 - 1859.											
	Hamaguchi, S., et al. "Simulations of trench-filling profiles under ionized magnetron sputter metal deposition," J. Vac. Sci. Technol. B, Vol. 13, No. 2, Mar/Apr 1995, pp 183 - 191.											
	Holber, W.M., et al. "Copper deposition by electron cyclotron resonance plasma," J. Vac. Sci. Technol. A 11(6), Nov/Dec 1993, pp 2903 - 2909.											
	Homma, Y., et al. "Planar deposition of aluminum by RF/DC sputtering with RF bias," J. Electrochem. Soc. Vol. 132, No. 6, June 1985; pp 1466 - 1472.											
	Ivanov, I., et al. "Electron energy distribution function in a DC magnetron sputtering discharge," Vacuum, Vol. 43, No. 8, 1992, pp 837-84.											
	Kidd, P. "A magnetically confined and electron cyclotron resonance heated plasma machine for coating and ion surface modification use," J. Vac. Sci. Technol. A, Vol. 9, No. 3, May/Jun 1991, pp 466 - 473											

EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP § 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to the applicant.

	Kitamoto, Y., et al. "Compact sputtering apparatus for depositing Co-Cr alloy thin films in magnetic disks," Proc. Of the 4 th ISSP (Kanazawa, 1997), pp 518 - 522.
	Klawuhn, E., et al. "Ionized physical-vapor deposition using a hollow-cathode magnetron source for advanced metallization," J. Vac. Sci. Technol. A 18(\$), Jul/Aug 2000, pp 1546 - 1549.
	Kochel, L.J. "Pressure control of RF bias for sputtering," Rev. Sci. Instrum., Vol. 47, No. 12, Dec. 1976, pp 1556 - 1557.
	Koenig, H., et al. "RF sputtering system with variable substrate bias," IBM Techn. Discl. Bulletin Vol. 13, No. 2 (July 1970), pp 323 - 324.
	Kotani, H., et al. "Sputter-etching planarization for multilevel metallization," J. Electrochem. Soc.: Solid-State Science and Technology, Vol. 130, No. 3., March 1983, pp 645 - 648.
	Matsuo, S. "Reactive ion-beam etching and plasma deposition techniques using electron cyclotron resonance plasmas," Academic Press, Inc. , 1983, pp 76 - 117.
	Matsuoka, M., et al. "Dense plasma production and film deposition by new high-rate sputtering using an electric mirror," J. Vac. Sci. Technol. A, Vol. 7, No. 4, Jul/Aug 1989, pp 2652 - 2657.
	Musil, J., et al., "Unbalanced magnetrons and new sputtering systems with enhanced plasma ionization," J. Vac. Sci. Technol. A, Vol. 9 No. 3, May/Jun 1991, pp 1171 - 1177.
	Nender, C., et al. "High bias sputtering for large-area selective deposition," Thin Solid Films 228 (1993) May 15, Nos.1-2, pp 87 - 90.
	Park, I.S., et al. "A novel Al-reflow process using surface modification by the ECR plasma treatment and its application to the 256Mbit DRAM," IEEE 1994, pp 109 - 112.
	Rossnagel, S.M. "Collimated magnetron sputter deposition with grazing angle ion bombardment," J. Vac. Sci. Technol. A 13(1), Jan/Feb 1995, pp 156 - 158.
	Samukawa, S., "Wave propagation and plasma uniformity in an electron cyclotron resonance plasma," J. Vac. Sci. Technol. A 11(5), Sep/Oct 1993, pp 2572 - 2576.
	Skelly, D. W., et al. "Significant improvement in step coverage using bias sputtered aluminum," J. Vac. Sci. Technol. A 4(3), May/Jun 1986, pp 457 - 460.
	Suzuki, K., et al. "Microwave plasma etching," unknown pub., Vol. 34, No. 10, 1984, pp 953-957.
	Suzuki, K., et al. "Microwave plasma etching," Japanese J. Applied Physics, Vol. 16, No. 11, Nov 1977, pp 1979-1984.
	Wada, J., et al. "Cu dual damascene process fo 0.13 μ m technology generation using self ion sputtering (SIS) with ion reflector," IEEE 2000, pp 108 - 110.
	Yamashita, M. "Fundamental characteristics of built-in high-frequency coil-type sputtering apparatus," J. Vac. Sci. Technol. A, Vol. 7, No. 2, Mar/Apr 1989, pp 151 - 158.
	Yasui, T., et al. "Electron cyclotron resonance plasma generation using a planar ring-cusp magnetic field and a reentrant coaxial cavity," J. Vac. Sci. Technol. A 13(4), Jul/Aug 1995, pp 2105 - 2109.
	Yamazato, M., et al. "Preparation of TiN thin films by facing targets magnetron sputtering," Proc. Of the 4 th ISSP (Kanazawa, 1997), pp 634 - 638.
	Anon. "Endpoint detection method for ion etching of material having a titanium nitride underlayer," Research Disclosure, Feb 1991, No. 322, 1 pg.
	Novellus Systems, Inc. "Damascus: 12 Steps of Damascus," webpages printed 1998, 14 pp.
	"SypherLine by MTi," advertisement, Semiconductor International, Nov. 1985; 4 pp.
	"Applications Note, MTi," internal and/or marketing document, Vol. 1, No.1, April 1986, 4 pp.

March 19, 2007

Sheet 2 of 2

EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP § 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to the applicant.